SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 30.—"The Theory of Photographic Processes, Part ii. On the Chemical Dynamics of Development, including the Microscopy of the Image." By S. E. **Sheppard** and C. E. K. **Mees.** Communicated by Sir William Ramsay, K.C.B., F.R.S.

This paper forms a continuation of a preceding one on the kinetics of development (*Proc.,* lxxiv. pp. 447–473). By microscopical methods, the growth in the thickness of the reduced layer of silver particles, in their size and their number, under varying conditions of exposure and development, has been studied. For the structure of the developed negative the following facts were ascertained:—

(a) With constant development for a short time the depth of the image is independent of the exposure.

(b) With increased time the depth increases very rapidly at first, reaching a maximum for each exposure, after which it is constant, while the density of reduced silver still increases.

(c) With long development the depth increases somewhat with the exposure, a limit naturally being fixed by that of the film.

Size of the Grain.—This increases with the time of development, the *rate* being a function of the exposure, but the limiting size independent of this, and fixed by the original haloid grain. Thus in the early stages of development the size of the grain increases with exposure, but on ultimate development is independent of it.

Soluble bromides at moderate concentration give a smaller grain for the same time of development, but depending on the exposure. On ultimate development the size becomes the same.

Number of Grains Reduced.—In the surface-area the number is independent of the exposure, but in the volume unit for moderately long development the number increases with the exposure, and is nearly proportional to the density. It increases rapidly with the time of development, more so than the density, and soon reaches a maximum.

When plates are exposed through the glass side, the thickness of the reduced layer is much the same, but the numbers less. Further, the grains nearer the glass are larger, showing that the more exposed grains start development first. Generally, each grain develops as an isolated system, only uniting to form "aggregates" when the packing is close, as in high exposures. The true reaction-layer is in the gelatin skin surrounding the grain, its thickness being of the order 0·0005 mm., and the reaction is similar to the catalysis of H_2O_2 by colloidal metals, with convection excluded.

Early Stages of Development.—From considerations of the order of reactions the validity of the Watkins factorial method of development is discussed, and the "time of appearance" shown to be a measure of the development-velocity for the initial stage of development. For ferrous oxalate this initial velocity is shown to be proportional to the concentration.

Effect of temperature for ferrous oxalate can be represented by the formula of van 't Hoff, log $K = -A/T + C$, but the temperature-coefficient for $10°$, $K + 10°/K$, varies for different developers and emulsions, and cannot serve as a criterion for distinguishing rate of chemical action from diffusion in development.

It is further shown that "tanning" the film with formalin does not alter the development-velocity.

For the "penetration" of the developer, it was found that with plates exposed from the back the image appeared on the glass or film side first according to the exposure. This is explained by consideration of the micro-structure of the exposed film, and the conclusion is again obtained that the "re-activity" or readiness to start development of the individual grain is a steady function of the exposure.

From the absolute "time of appearance" of the image at the back it is concluded that the diffusion-induction is not great, especially since other considerations show that in the early stages of development the chemical reaction has more influence than diffusion.

Chemical Society, May 17.—Prof. R. Meldola, F.R.S., president, in the chair.—The desmotropic form of substances of the ethyl acetoacetate type in the homogeneous state and dissolved in neutral media: J. W. **Brühl** and H. **Schröder.** The authors claim to have established by optical measurements with solutions in various media that both the ethyl acetoacetates and their secondary and tertiary alkyl derivatives, and also the camphorcarboxylic esters and their alkyl derivatives, display a pure uniform ketonic structure, and are free from the enolic forms.—The chlorination of methyl derivatives of pyridine, part i., 2-methylpyridine: W. J. **Sell.** The compound C_6HCl_6N was obtained by chlorinating 2-methylpyridine in hydrochloric acid solution.—The absorption spectra of uric acid, murexide, and the ureides, in relation to colour and their chemical structure: W. N. **Hartley.** The ureides, diureides, and some oxypurin derivatives are divided by the characters of their absorption spectra into two groups, the oximino-ketones with no ethylenic linking associated with the carbonyl groups, and the substances which have one or more such linkings.—Observations on chemical structure and physical properties associated with the theory of colour: W. N. **Hartley.** The main feature in a coloured substance is the occurrence in two parts of the molecule of ethylenic and benzenoid groupings and of ketonic groupings. The explanation of colour, based on the change from a double linking (ketonic) to a single linking (enolic), should, if sound, be capable of explaining the occurrence of six bands in the spectrum of benzene, four in that of naphthalene, and four in that of anthracene. It is shown how this is possible from Kekulé's formula for benzene, and how this formula may be reconciled with the "centric" formula.—Further studies on dihydroxymaleic acid: H. J. H. **Fenton.** This paper describes the results of a study of the condensation of the acid with ammonia, and the behaviour of the acid and its esters towards various hydrazines.—The influence of light on diazo-reactions, preliminary notice: K. J. P. **Orton** and J. E. **Coates,** and (in part) F. **Burdett.**—Behaviour of solutions of propyl alcohol towards semi-permeable membranes: A. **Findlay** and F. C. **Short.** Some years ago Pickering stated that when a porous pot containing a 57 per cent. aqueous solution of propyl alcohol was immersed in either pure water or pure propyl alcohol, the water or the alcohol passed inwards to the solution. The authors have been unable to confirm Pickering's experiments, and suggest that the behaviour observed by him might be temporary and due to differences in the velocity of the diffusion of the pure liquids and the solution.—The thermal decomposition of formaldehyde and acetaldehyde: W. A. **Bone** and H. L. **Smith.** Formaldehyde decomposes at all temperatures between $400°$ and $1125°$ in accordance with the equation $CH_2O = CO + H_2$, and acetaldehyde at $400°$ in accordance with the equation $CH_3.CHO = CH_4 + CO$.—The synthesis of formaldehyde: D. L. **Chapman** and A. **Holt,** jun. The authors have succeeded in synthesising formaldehyde by maintaining a platinum wire at a high temperature in the following mixtures:—(a) carbon monoxide and hydrogen; (b) carbon monoxide, hydrogen, and steam; (c) carbon monoxide and steam; (d) carbon dioxide and hydrogen.—Oxymercuric perchlorates and the action of alcohol on mercury perchlorates: M. **Chikashige.** Three new oxymercuric perchlorates are described.—The constitution of pilocarpine, part v., conversion of *iso*pilocarpine into pilocarpine: H. A. D. **Jowett.**

Royal Meteorological Society, May 17.— Capt. D. Wilson-Barker, vice-president, in the chair.—Measurement of evaporation: R. **Strachan.** The author pointed out that the rainfall, evaporation, and percolation are related to each other, and that rainfall is commonly considered to form the sum of evaporation and percolation. If two of these quantities are found by experiment or observation, the other is assumed to be known. This, however, does not always hold good. A month may be very dry, and still evaporation will go on at the expense of previous percolation—and otherwise. A month may be excessively wet, then there may be another item to take into account, viz. overflow. As, unfortunately, it is not possible to make evaporation and percolation the subject of experi-

ment, except at a very few observatories, the author thinks it is desirable to be able to estimate, even empirically, the probable amounts of each. By using the meteorological data published for the Royal Observatory, Greenwich, he has calculated the probable evaporation for the year 1898, which agrees very closely with the observed evaporation at Camden Square and also at Croydon.—On a logarithmic slide-rule for reducing readings of the barometer to sea-level : J. **Ball.** This has been devised for the purpose of saving the time and labour usually occupied in working out the corrections from the international meteorological tables.

Royal Microscopical Society, May 17.—Dr. Dukinfield H. Scott, F.R.S., president, in the chair.—The movements of diatoms and other microscopic plants : D. D. **Jackson.** The author describes the observations and experiments made by him, some with artificial diatoms, which have led him to the conclusion that the movements referred to are caused by the escape of oxygen gas evolved in these organisms.

Faraday Society, May 18.—Dr F. Mollwo Perkin, treasurer, in the chair.—An application to electrolytes of the hydrate theory of solutions : Dr. T. Martin **Lowry.** The object of the paper is to consider the possibility of extending the hydrate theory to electrolytes in such a way as to take account of the observations which form the experimental basis of the theory of electrolytic dissociation. The hydrate theory postulates that an aqueous salt solution consists of a mixture of hydrates in equilibrium with the solvent and with one another. But it must be supposed that even in solution there is a limit to the possibility of hydrate formation, so that ultimately a stage will be reached at which the molecule as such will be unable to combine with any further quantity of water. The ionisation of an aqueous electrolyte consists essentially in a further process of hydration whereby the fully hydrated molecule combines with an additional quantity of water to form two or more hydrated ions. The hydration of the ions is thus conceived to be the primary cause of the ionisation of aqueous electrolytes. It is believed that this extension of the hydrate theory to the phenomena of electrolysis may help to remove the fundamental difficulty of Arrhenius's theory, namely, the absence of a motive for electrolytic dissociation.

Physical Society, May 26.—Meeting at the National Physical Laboratory by invitation of the director, Dr. Glazebrook.—The following special demonstrations were made :—The specific heat of iron at high temperatures : Dr. J. A. **Harker.** A knowledge of the specific heat of iron is important in the determination of high temperatures by calorimetric methods. Dr. Harker has determined the total heat of iron up to temperatures of 900° C. by heating the specimen in an electric furnace, the temperature of which was determined by a resistance thermometer, and dropping the iron into a water calorimeter. Dr. Harker also exhibited some new types of electric furnace for the attainment in absence of noxious gases of temperatures between 800° C. and 2200° C. The conductor conveying the electric current is a tube of solid electrolytes similar in composition to the filament of a Nernst lamp. An essential feature is that, for many purposes, the usefulness and life of a furnace constructed in this way may be much increased by adopting a " cascade " system of heating.—Apparatus for the measurement of small inductances : A. **Campbell.** The method of measurement is that adopted by Max Wien, and described by him in a paper on " Magnetisation by Alternating Currents " (*Wied. Ann.,* xiii., August, 1898). It is a modification of Maxwell's method of comparing two self-inductances, the source of voltage being alternating, and the indicating instrument a tuned optical telephone or vibration galvanometer.—Two new optical benches constructed for the laboratory by Messrs. R. and J. Beck : J. **Selby.** One of these is specially designed for the rapid testing of spherical and cylindrical lenses, such as are found in oculists' trial cases. The second bench is designed for the determination of the loss of light by absorption and reflection in telescopes and binoculars.
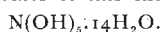
CAMBRIDGE.

Philosophical Society, May 1.—Prof. Liveing, vice-president, in the chair.—On the striation of the positive column in electric discharges : Prof. **Thomson.** The author considered the ionisation in a discharge tube by the collision of charged ions as well as of corpuscles against the molecules of a gas, and showed that if the pressure in the tube and the electric current through it had values situated between certain limits, there would be periodic alternations in the positive column analogous to striations.—On the calculation of the coefficient of re-combination of the ions and the size of the ions : Prof. **Thomson.** The re-combination of ions is due to oppositely charged ions attracting each other and forming a single system. When the ions are at a distance r apart the work required to separate them to an infinite distance is e^2/r, hence two ions starting from a distance r apart will not describe closed orbits about each other, *i.e.* will not combine if their kinetic energy is greater than e^2/r. Since the ions behave like the molecules of a gas, their kinetic energy will depend only upon the temperature, and can be calculated when that is known. If T is this kinetic energy, then for combination to take place e^2/r must be greater than T, or r less than e^2/T. Hence to find the number of re-combinations in any time, all we have to do is to find the number of pairs of ions which within that time get within a distance e^2/T of each other. This number, and hence the coefficient of re-combination, is easily calculated. If we assume that the ions in hydrogen are charged molecules of hydrogen, the coefficient of re-combination at 0° C. would be 1.5×10^{-6} ; the value found by experiment is about 10^{-6}, hence we conclude that the hydrogen ion is more complex than the hydrogen molecule. The kinetic energy due to temperature is shown to prevent the ions getting very much larger than the molecules ; thus if the radius of the molecule were 10^{-8} cm., the radius of the ion could not exceed 3×10^{-8}.—Some physical properties of sodium vapour : P. V. **Bevan.** The experiments described in this paper were made to investigate the phenomena of the cloud of sodium vapour formed by heating a piece of metallic sodium *in vacuo* or in an atmosphere of hydrogen. In certain circumstances the sodium vapour forms a very sharply defined cloud with apparently a definite surface across which diffusion does not take place. The formation of this cloud, which was discovered by Prof. R. W. Wood, was found to be conditioned by the presence of water vapour in the atmosphere in which the sodium was heated. *In vacuo* the sodium vapour behaves like any other vapour, and in perfectly dry hydrogen there is no definite surface to the vapour observable when the sodium is heated. It was also shown that *in vacuo* the sodium begins to form vapour at the temperature of boiling water. The view is put forward that when the sodium cloud is seen on heating sodium in a vacuum tube the effect is due to the formation of an atmosphere of hydrogen occluded by the sodium and formed by the action of the sodium on sodium hydroxide.—A null method of measuring small ionisations : N. R. **Campbell.** Measurements have been made of spontaneous ionisations by adjusting the pressure of the air in a closed vessel containing a constant amount of uranium until the current through that vessel was equal and opposite to that through the spontaneously ionised gas. By this device certain difficulties connected with the measurement of capacity and the preservation of insulation are avoided.—The reflexion of sound at a paraboloid : Rev. H. J. **Sharpe.**

DUBLIN.

Royal Dublin Society, April 18.—Prof. J. A. McClelland in the chair.—Notes on the constitution of nitric acid and its hydrates : W. Noel **Hartley.** The author referred to a paper by him published in 1903 in the *Chem. Soc. Trans.* on the absorption spectra of nitric acid in various states of concentration. He had assigned the formula H_3NO_3 to normal nitric acid, and suggested that the several hydrates described were hydrates of this acid ; but H. Erdmann, also in 1903, having isolated and described five nitric acids, the author was led to revise the formulæ of the hydrates in accordance with the constitution of these

compounds. The normal acid being pentabasic, $N(OH)_5$, there are several hydrates of this extending to

$$N(OH)_5.14H_2O.$$

Ordinary nitric acid of 1·42 sp. gr. consists entirely of the octobasic acid $(HO)_4N.O.N(OH)_4$, and the crystallisation of this was shown to the meeting by cooling the acid in liquid air.—The effect of very low temperature on moist seeds : John **Adams.** Seven species of moist seeds were submitted to the temperature of liquid air, with the result that they were all killed, while dry seeds were not adversely affected. The physiological processes involved were next considered, as well as the various theories put forward to account for death by freezing. An attempt was made to bring the results obtained into line with Macfadyen's experiments on bacteria, and the more recent investigations of Edwin J. Smith and Deane B. Swingle.—Injurious insects and other animals observed in Ireland during the year 1904 : Prof. G. H. **Carpenter.** In this paper special attention is paid to Cecidomyiidæ, the pear-midge (*Diplosis pyrivora,* Riley) being recorded, and an account of *Rhabdophaga heterotia,* Loew., very destructive to osier beds in the county of Kilkenny, being given. Further instances are mentioned of Collembola injurious to plant roots and a new species of oribatid mite (*Lohmannia insignis,* Berlese) destructive to bean seedlings is described. The life-history of the well known mangold fly (*Pegomyia betae,* Curtis) is worked out in some detail.—Prof. **McClelland** made an addition to the communication he laid before the society at its February meeting.

EDINBURGH.

Royal Society, May 1.—Prof. Geikie in the chair.— The internal structure of *Sigillaria elegans* of Brongniart's " Histoire des Végétaux fossiles " : R. **Kidston.** The primary xylon formed a continuous ring as in *S. elongata,* Bgt., described by Prof. Bertrand, but the protoxylon groups formed rounded projections, not pointed, as in *S. elongata.* The paper concluded with some general remarks on the development of the primary xylon of the Carboniferous lycopods, and the opinion was expressed that the solid stele was the most primitive type, followed by the continuous ring with a medulla, the series ending in that type of structure found in *S. spinulosa,* where the primary xylon assumes the form of a circle of isolated bundles.—The rainfall of the drainage area of the Talla reservoir : B. Hall **Blyth** and W. A. **Tait.** The observations had been carried out in connection with the new Edinburgh Water Works in order to obtain data for fixing an equitable compensation to the Tweed Salmon Fisheries Commissioners and other proprietors in the district. Seven gauges had been established at various levels, and observations had been taken continuously for seven years from 1896. The lowest gauge, at a height of 966 feet, gave an annual average of 61·43 inches, and the highest, at a height of 2627 feet, gave 65·53 inches, or only 0·41 per cent. per 100 feet rise. The greatest average was given by the gauge at the height of 1537 feet, the value being 73·92 inches. These facts showed that the rainfall was greatly affected by the exposure to prevailing winds and the character of these winds, quite apart from the effect of height. The extent of the drainage area was 6180 acres, and the average annual rainfall, as estimated from the observations, was nearly 14,600,000 gallons per day, of which one-third had to be given off as compensation.—The rainfall records in the Talla drainage area from 1896 to 1902 : P. D. **Donald.** This contained further discussions of the records. The observations of rainfall were being continued by the Water Trust, and it was hoped that the information so gained would be of special value to all interested in water supply.—Variant forms of vanishing aggregates of minors of axisymmetric determinants : Prof. **Metzler.**

PARIS.

Academy of Sciences, May 29.—M. Troost in the chair.— The exact transmission of time by the telephone : E. **Guyou** (see p. 134).—On cyanocampho-acetic, cyanocampho-*a*-propionic, cyanocampho-*a*-butyric acids and their principal derivatives : A. **Haller** and A. **Courémenos.** The sodium derivative of cyanocamphor reacts with the methyl and ethyl esters of the *a*-monochlor- and monobromo fatty acids similarly to the alkyl iodides and bromides previously studied, the camphor derivative behaving as if it possessed the enolic form. These new compounds can be saponified by alcoholic potash, furnishing the corresponding acids, several esters, salts, and amides being described in detail. —The oscillations of locomotives under the action of various disturbing forces : Georges **Marié.** A study of the conditions under which the oscillations may accumulate to a dangerous amplitude, and of the means of avoiding these conditions in practice.—On the continued algebraical fractions of Laguerre : R. de Montessus **de Ballore.**— On partial differential equations of the elliptic type : S. **Bernstein.**—On the interpolation of continuous functions by polynomials : Martin **Krause.**—The electrolytic production of very fine wires : Henri **Abraham.** Starting with a fine drawn wire of a given material, the metal is removed electrolytically in a suitable bath, the resistance of the wire being measured during the experiment, the increase of the resistance giving an exact measure of the reduction of the diameter. For the production of uniform wires it is necessary that the electrolysis be conducted very slowly, and the method proved very successful for the purpose in view.—On tangential irradiation : A. **Guébhard.** A discussion of the mechanical and electrical theories as to the cause of photographic irradiation.—The examination of phosphorus sulphide for the presence of free white phosphorus : Léo **Vignon.** The Mitscherlich reaction (distillation with water) is useless for detecting free phosphorus in commercial phosphorus sulphide ; the removal of the free phosphorus by heating in a current of hydrogen proved more serviceable.—On a reaction with discontinuous velocities of the green sulphate of chromium : Albert **Colson.**—On some physical properties of propane : Paul **Lebeau.** Pure propane was obtained from three sources, normal propyl iodide, isopropyl iodide, and isopropyl chloride, the final purification being effected in all three cases by fractional distillation of the liquefied gas. It remained liquid at the temperature of liquid air ($-195°$), boiled at $-44°·5$ C., and had a critical temperature of $97°·5$ C., the critical pressure being 45 atmospheres. Propane is soluble in several reagents, its solubility being much greater than either methane or ethane. It is interesting to note that although propane does not solidify at $-195°$ C., methane, its lower homologue, is crystalline at $-184°$ C.—On methyl-acetyl-carbinol : André **Kling.** This acetol can be obtained by the oxidation of 2 : 3-butanediol by the action of the sorbose bacterium and by *Mycoderma aceti.* The resulting keto-alcohol is dextrorotatory, the oxidation proceeding at the expense of the lævo-form. The semicarbazone is well crystallised and readily isolated, and forms the best means of identifying this substance.—On the oxide of methoethenylbenzene : M. **Tiffenau.**—Syntheses in the anthracene series. The condensation of derivatives of benzodihydrofurfurane into γ-substituted anthracene derivatives : A. **Guyot** and J. **Catel.**—On methylnatalœmodine and natalœmodine : E. **Léger.** The name natalœmodine is given to a trioxy-methyl-anthraquinone obtained by the action of sodium peroxide upon the aloin from Cape aloes. Details are given of its properties and the preparation of some of its derivatives.—On the acidity of some ethyl alcohols of commerce and on the variations in acidity at the ordinary temperature : René **Duchemin** and Jacques **Dourlen.** Alcohol slowly oxidises in the presence of air at the ordinary temperature, acetic acid being formed. The amount formed depends on the nature of the containing vessel. —The conductivity of colloidal solutions : J. **Duclaux.** A solution of a colloid can be filtered through a collodion film, crystalline substances passing readily through such a filter, the colloid remaining behind. It was found that the conductivity of the concentrated solution of the colloid was appreciably greater than that of the filtrate. From the results of the measurements it was calculated that the electric charge on each particle of colloidal ferric hydrate was about 1/500th of that corresponding to the gram-valence of an ion.—On the presence of noumeite in the detritic state in the neo-Caledonian Eocene : M. **Deprat.**—The wild coffee trees of French Guinea : A.

Chevalier.—On *Oïdium lactis* and the ripening of cream and cheese : J. **Arthaud-Berthet.**—On *Stearophora radicicola*, a fungus of the roots of the vine : L. **Mangin** and P. **Viala.**—The pathogenic action of *Stearophora radicicola* on animals : MM. **Charrin** and **Le Play.**—The phenomena of sexuality in the development of the Actinomyxides : M. **Caullery** and F. **Mesnil.**—The histological phenomena of asexual reproduction in Salmacina and Filograna : A. **Malaquin.**—Some variations in the coefficient of demineralisation in animals in a state of acid dyscrasia : A. **Desgrez** and Mlle. Bl. **Guende.**—The experimental reproduction of human cancer : M. **Mayet.**—On distemper in dogs : H. **Carré.**—On the geology of the Piedmont zone : Maurice **Lugeon** and Émile **Argand.**

DIARY OF SOCIETIES.

THURSDAY, JUNE 8.

ROYAL SOCIETY, at 4.30.—Researches on Explosives. Part III. : Sir Andrew Noble, Bart., K.C.B., F.R.S. (1) On the Thermoelectric Junction as a Means of Determining the Lowest Temperatures ; (2) Studies with the Liquid Hydrogen and Air Calorimeters : Sir James Dewar, F.R.S.—Colours in Metal Glasses, and in Metallic Films and Metallic Solution : J. C. Maxwell Garnett.—On the Application of Statistical Mechanics to the General Dynamics of Matter and Ether. The General Method of Statistical Mechanics : J. H. Jeans.—On the Magnetic Qualities of some Alloys not containing Iron : Prof. J. A. Fleming, F.R.S., and R. A. Hadfield.—On the Phosphorescent Spectra of Sô and Europium : Sir William Crookes, F.R.S.—On the Perturbations of the Bielid Meteors : Dr. A. M. W. Downing, F.R.S.—The Asymptotic Expansion of Integral Functions defined by Taylor's Series : Rev. E. W. Barnes.—Preliminary Note on Observations made with a Horizontal Pendulum in the Antarctic Regions : Prof. J. Milne, F.R.S.—Note Supplementary to a Paper "On the Radio-active Minerals" : Hon. R. J. Strutt, F.R.S.—The Morphology of the Ungulate Placenta, particularly the Development of that Organ in the Sheep, and Notes upon the Placenta of the Elephant and Hyrax : R. Assheton.—A Preliminary Communication on the Life History of *Trypanosoma balbianii* : W. S. Perrin.—On the Effect of Carbon Dioxide on Geotropic Curvature of the Roots of *Pisum Sativum* : E. Drabble and Miss H. Lake.—The Pharmacology of Indaconitine and Bikhaconitine : Prof. J. T. Cash, F.R.S., and Prof. W. R. Dunstan, F.R.S.—Preliminary Note on the Occurrence of Microsporangia in Organic Connection with the Foliage of Lyginodendron : R. Kidston, F.R.S.—Chitin in the Carapace of *Pterygotus Osiliensis* from the Silurian of Oesel : Dr. Otto Rosenheim.—(1) The Synthesis of a Substance allied to Adrenalin ; (2) On the Physiological Activity of Substances indirectly allied to Adrenalin : Dr. H. D. Dakin.

ROYAL INSTITUTION, at 5.—Electromagnetic Waves : Prof. J. A. Fleming, F.R.S.

MATHEMATICAL SOCIETY, at 5.30.—On a Class of Many-valued Functions Defined by a Definite Integral : G. H. Hardy.—On the Condition of Reducibility of any Group of Linear Substitutions : Prof. W. Burnside. On Criteria for the Finiteness of the Order of a Group of Linear Substitutions : Prof. W. Burnside.

FRIDAY, JUNE 9.

ROYAL INSTITUTION, at 9.—Submarine Navigation : Sir William White, K.C.B., F.R.S.

ROYAL ASTRONOMICAL SOCIETY, at 5.—The Meteors from Biela's Comet : W. F. Denning.—On the Formula for connecting Diameters of Photographic Images with Stellar Magnitude : H. H. Turner.—(1) The Moon's Observed Latitude, 1847–1901 ; (2) On the Discordant Values of the Principal Elliptic Coefficients in the Moon's Longitude : P. H. Cowell. —Determinations of Stellar Parallax from Photographs taken at the Cambridge Observatory. Introductory Paper : A. R. Hinks and H. N. Russell.—The Most Probable Position of a Point determined from the Intersections of Three Straight Lines : S. A. Saunder.—On the Relative Efficiency of Different Methods of Determining Longitudes on Jupiter : A. Stanley Williams.

SATURDAY, JUNE 10.

ROYAL INSTITUTION, at 3.—Exploration in the Philippines : A. H. Savage Landor.

WEDNESDAY, JUNE 14.

MINERALOGICAL SOCIETY, at 8.—The Chemical Composition of Lengenbachite : Dr. A. Hutchinson.—The Identity of the Ancient Amiantos of Cyprus with Chrysotile : Dr. J. W. Evans.—The Chemical Composition of Hutchinsonite : G. T. Prior.

CHEMICAL SOCIETY, at 5.30.—Influence of Various Sodium Salts on the Solubility of Sparingly Soluble Acids : J. C. Philip.—The Dielectric Constants of Phenols and their Ethers Dissolved in Benzene and *m*-Xylene : J. C. Philip and Miss D. Haynes.—Synthesis by Means of the Silent Electric Discharge : J. N. Collie.—The Ultra-violet Absorption Spectra of Benzene and Certain of the Mono-substituted Derivatives : E. C. C. Baly and J. N. Collie.—Association in Mixed Solvents : G. Barger.—The Ultra-violet Absorption Spectra of Derivatives of Benzene. Part II. The Phenols : E. C. C. Baly and Miss E. K. Ewbank. —The Action of Water on Diazo-salts. A Preliminary Note : J. C. Cain and J. M. Norman.—Synthesis of Substances Allied to Epinephrine : G. Barger and H. A. D. Jowett.—A Precise Method of Determining the Organic Nitrogen in Potable Waters : J. Campbell Brown.—Synthesis of

1 : 1-Dimethyl-Δ^3-tetrahydrobenzene : A. W. Crossley and Miss N. Renouf.—Bromine in Solutions of Potassium Bromide : F. P. Worley.

THURSDAY, JUNE 15.

LINNEAN SOCIETY, at 8.—Biscayan Plankton. Part VI. Colloid Radiolaria : Dr. R. N. Wolfenden.—Biscayan Plankton. Part VII. Mollusca : Dr. P. Pelsener.—(1) Longitudinal Nerves and Transverse Veins in Bamboos'; (2) Some Indian Undershrubs : Sir D. Brandis, K.C.I.E., F.R.S.—Notes on a Skeleton of the Musk-duck, *Bizuria lobata* : W. P. Pycraft.—*Exhibitions : Arum maculatum,* in Relation to Insects (with lantern slides) : Rev. J. Gerard, S.J.

FRIDAY, JUNE 16.

PHYSICAL SOCIETY, at 8.—On the Ratio between the Mean Spherical and Mean Horizontal Candle-power of Incandescent Lamps : Prof. J. A. Fleming, F.R.S.—The Electrical Conductivity of Flames : Dr. H. A. Wilson.—Contact with Dielectrics : R. Appleyard.—The Pendulum Accelerometer, an Instrument for the Direct Measurement and Recording of Acceleration : F. Lanchester.—A New Form of Pyknometer : N. V. Stanford.—Exhibition of a Refractometer : R. Appleyard.

MALACOLOGICAL SOCIETY, at 8.—Lecture on the Prosobranchiate Mollusca : J. E. S. Moore.—On the Extension of the Genus Macrochlamys to the Island of Mauritius : Lieut.-Col. H. H. Godwin-Austen.—Mollusca of the Porcupine Expeditions, Supplemental Notes, Part II. : E. R. Sykes.—On a Small Collection of Mollusca from Tierra del Fuego : E. A. Smith.—On two Miocene Gastropods from Roumania : R. Bullen Newton.—Revision of the New Zealand Patellidæ, with Descriptions of a New Species and Subspecies : Henry Suter.—The Conchological Writings of Captain Thomas Brown : C. Davies Sherborn.

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